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(54) Dispensing closure for containers

(57) A dispensing closure for a container comprises a rotor (14) and a stator or body portion (12), regular arrays of sealing detent members (26) being provided on the rotor (12) and corresponding members (28) being provided on the stator (12), which co-operate to funish a detent action and to seal off the interfacial region between the stator (12) and rotor (14) as the rotor (14) completes each rotational advance to a detent-defined position. This provides a double seal against sifting of the container contents from the dispensing opening (30) in the stator (12) through the interfacial region and to the dispensing opening (32) or (34) in the rotor (14) when the rotor (14) is in a closed position.

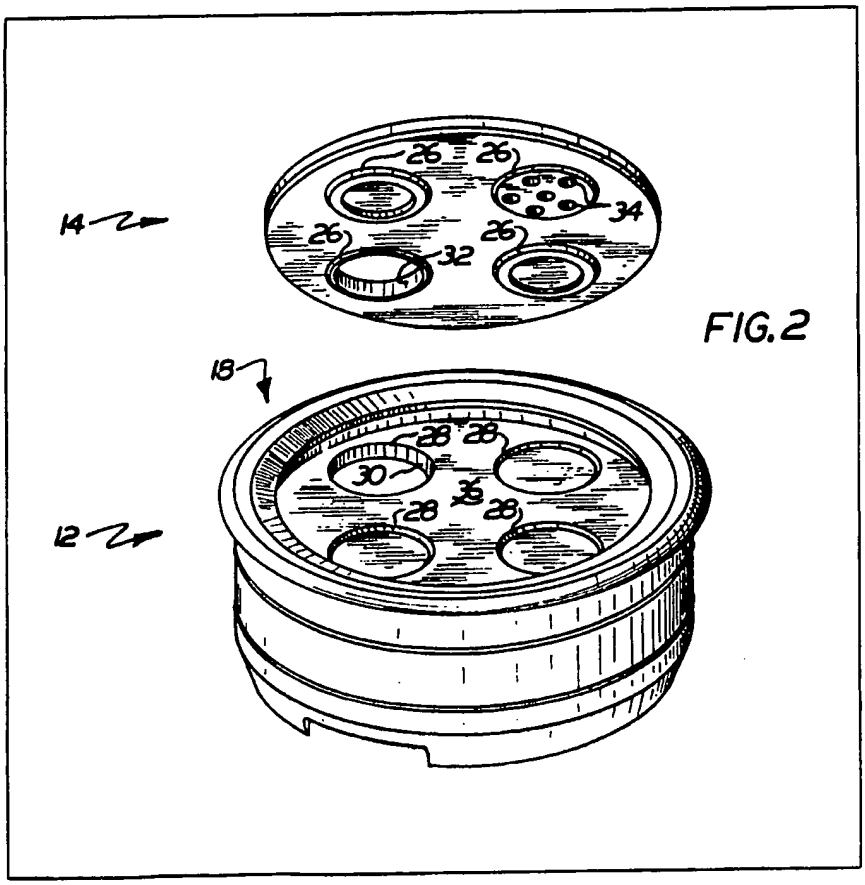

FIG. 2

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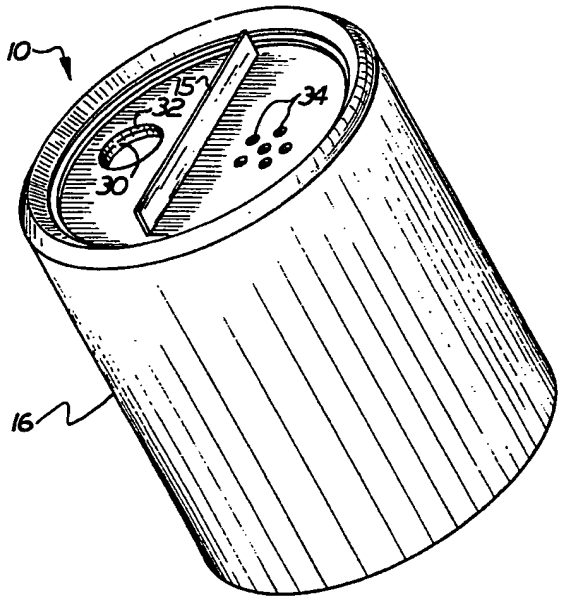


FIG. 1

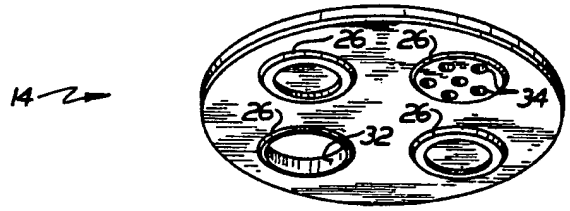


FIG. 2

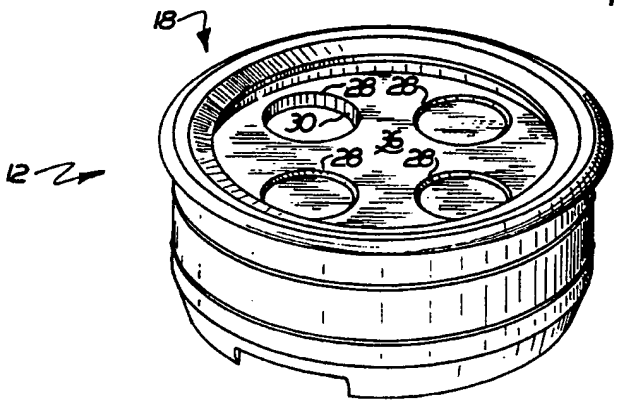


FIG.3

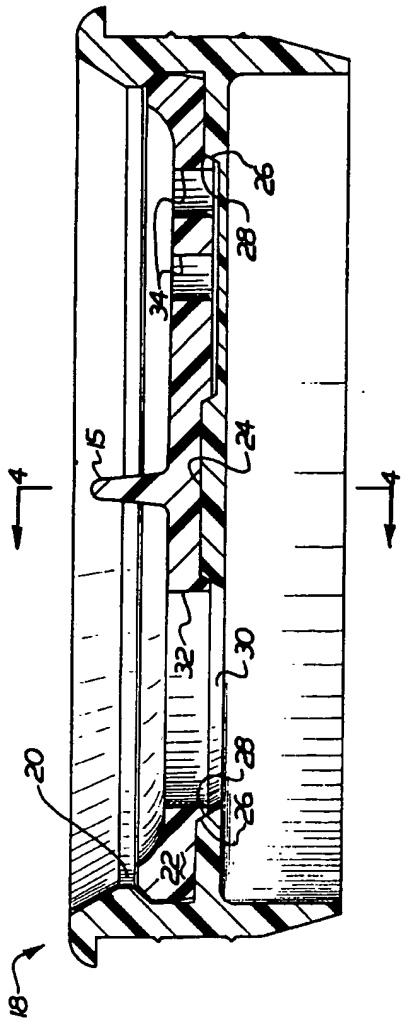


FIG.4

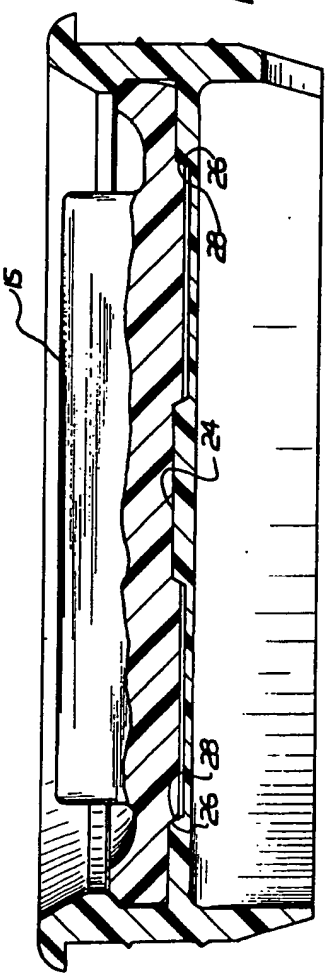


FIG.5

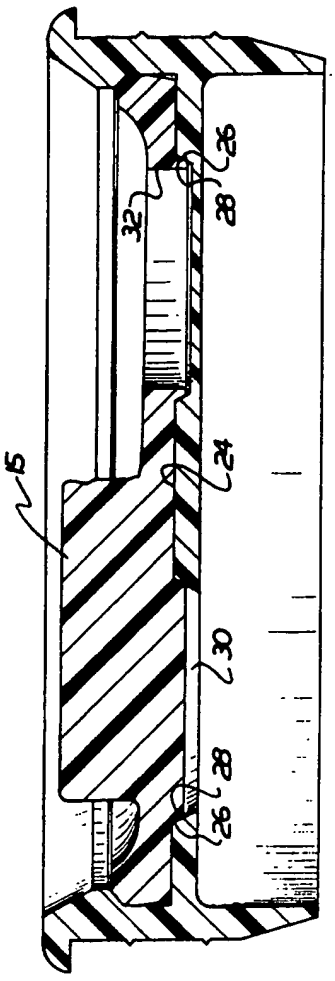
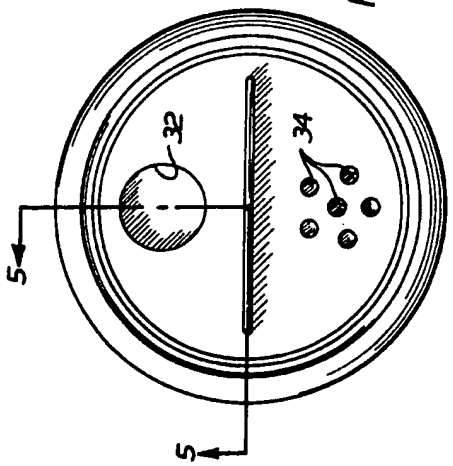


FIG.6



SPECIFICATION

Dispensing closure for containers

This invention relates to dispensing closures for containers of fine granular materials and the like, and particularly to closures of the type in which the rotor of the closure is retained solely by engagement of its rim with the rim portion of the stator or body of the closure.

When the rotor of such a closure is in a closed position, the fine materials in the container tend to sift along any leakage path that may be available in the closure. Leakage at the rim is generally not a problem because of the snug interengagement of the stator and rotor at that point. However, at the more central portions of the closure, the rotor and stator are free to flex away from each other, and the fine materials tend to sift from any dispensing opening in the stator through the central interfacial region between the stator and rotor and to any dispensing opening in the rotor.

The provision of a good "snap-in" seal between the rotor body and each dispensing opening in the stator, or between the stator body and each dispensing opening in the rotor will close the leakage pathway, but a relatively reliable assurance of a good seal at a given one of these locations requires tight tolerances and tight production controls and undesirably increases manufacturing costs, or alernatively one can expect a relatively high proportion of manufacturing production to consist of closures with poor antisift performance.

According to the present invention there is provided a dispensing closure for containers of fine granular materials and the like, comprising a stator and rotor, said stator constituting the body portion of the closure and being capable of being mounted on the end of a container to be closed, said rotor and stator being rotatably inter-engaged, for retenion of the one by the other in rotatable relationship, solely at their respective rim portions, with an interfacial region defined between said rotor and stator radially interiorly of their rim portions, corresponding regular arrays of sealing detnet members which co-operate with each other to provide a detent action and to seal off said interfacial region, one regular array comprising raised detent ribs and the other regular array comprising detent depressions, each regular array being associated with its own one of said rotor and stator members, said rotor having a number of detent-defined rotative positions relative to said stator and corresponding to the number of elements in each of said arrays, each of said raised circular detent ribs being capable of being received in sealing relationship in one of said detent depressions with a snap-in detent action as said rotor reaches each of its detent-defined rotative positions, at least one stator dispensing opening opening extending through one of said detent members on said stator and at least one rotor dispensing opening opening extending through one of said detent members on said rotor, said stator dispensing opening and rotor dispensing opening being aligned with each other in an open condition but each being sealed off from said interfacial region by said snap-in detent action of its associated detent member co-operating with the counterpart detent member on the opposed rotor or stator as said rotor reaches one of its detent-defined rotative positions, said stator dispensing opening and rotor dispensing opening being unalighed with each other in a closed condition but each again being sealed off from said interfacial region by said snap-in detent action of its associated detent member with a counterpart detent member on the opposed rotor or stator as said rotor reaches another one of its detent-defined rotative positions.

The present invention involves the concept of providing snap-in seals at both locations, so that as the closure's rotor reaches its detent-defined closed position, or as it reaches each such position if there is more than one such position, a snap-in seal is provided both (1) between the rotor body and each dispensing opening in the stator and (2) between the stator body and each dispensing opening in the rotor, to thereby seal the dispensing openings in both the stator and rotor from the interfacial region and thus, so to speak, attempt to close the leakage pathway at both ends. With this arrangement, the assurance of a good seal at a given end of the leakage path is not necessary, since a good seal of either end will do. Accordingly, manufacturing tolerances and controls need not be as tight as was formerly required in order to avoid producing a relatively high proportion of closures with poor anti-sift performance, or alternatively the use of tolerances and controls as tight as those formerly required can in theory exponentially reduce the proportion of produced closures having poor anti-sift performance. For example if tightening manufacturing tolerances and controls would reduce the proportion of defective parts produced down from 20 percent to 10 percent for prior art closures, the same tightening may theoretically effect a reduction down from 20 percent to 1 percent (10 percent of 10 percent) for the closure of the present invention if there is only one dispensing opening in both the rotor and stator. When there is more than one dispensing opening in each of these members, the theoretical improvement is less. Actual improvements may not equal those theoretically possible, but can still be considerable.

An embodiment of the invention will now be described, by way of an example, with

reference to the accompanying drawings, in which:—

Figure 1 is a perspective view of a container provided with the closure of the invention;

Figure 2 is an exploded perspective view of the rotor and stator of the closure on a slightly larger scale than Fig. 1;

Figure 3 is a cross section on a still larger scale showing the closure with the rotor in an open position;

Figure 4 is a cross-section taken approximately on the plane of line 4–4 in Fig. 3;

Figure 5 is a cross-sectional view taken approximately on the planes of line 5–5 in Fig. 6 ad showing the closure with the rotor in a closed position; and

Fig. 6 is a smaller scale top plan view of the closure.

As shown in the drawings, a closure 10 is provided for a container 16 (Fig. 1). The closure 10 comprises a stator 12 and a rotor 14 (Fig. 2). The stator 12 also constitutes the body portion of the closure and is intended to be mounted on and retained on the end of the container 16 in any conventional manner. The rotor 14 is provided with a turning tab or handle 15 (Figs. 1, 3–5). The rotor 14 and stator 12 may be injection moulded of suitable material such as polypropylene plastics material.

The rotor 14 and stator 12 are rotatably interengaged, for retention of the rotor 14 by the stator 12, solely at their respective rim portions, namely the rim portion 22 of the rotor 14 and the rim portion 18 of the stator 12 (Fig. 3). By suitable deflection of the parts, the rotor rim 22 is forced past the retainer lip 20 (Fig. 3) on the inside of the stator rim 18 so that the rotor 14 is assembled to the stator 12 in snugly retained relatively rotatable relationship therewith. A central interfacial region 24 (Figs. 3–5) is thereby defined between the rotor 14 and stator 12.

Corresponding regular arrays of sealing detent members are provided in asociation respectively with the rotor 14 and stator 12. The detent members of one array co-operate with those of the other to both furnish a detent action and to seal off the interfacial region 24. One of the regular arrays comprises an array of raised circular detent ribs 26 and the other regular array comprises circular detent depressions 28 (Figs. 2–5). In the particular closure shown in the drawings, the detent ribs 26 are associated with the rotor 14 and the detent depressions 28 are associated with the stator 12.

The rotor 14 has a number of detent-defined rotative positions relative to the stator 12 which corresponds to the number of elements in each detent array, or four positions in the case of the illustrated closure. As the handle 15 is turned to start moving the rotor 14 from a detent-defined rotative position, the leading sides of the detent ribs 26 ride up the corresponding sides of the detent depressions 28 with a wedging action. As rotary movement continues, the bottoms of the ribs 26 begin to slide along the top surface 36 (Fig. 2) of the central wall of the stator 12. As the rotor 14 reaches its next detent-defined rotative position, each of the ribs 26 is received in sealing relationship in one of the detent depressions 28 with a snap-in detent action.

A stator-dispensing opening 30 opens through one of the circular detent depressions 28 on the stator 12, and a rotor-dispensing opening 32 opens through one of the raised circular detent ribs 26 on the root 14. Sifting-dispensing openings 34 also open through another of the raised circular detent ribs 26.

In the particular closure illustrated,successive advances of the rotor 14 move the closure from "closed" to "full open" to "closed" to "sift open", or through four detent-de-fined positions.

In one of the detent-defined rotative positions of the rotor 14, the closure is in the open condition as seen in Figs. 1, 3 and 4, in which the dispensing openings 30 and 32 in the stator 12 and rotor 14 respectively are aligned with each other. The alignment of these openings occurs by the above described snap-in action of their associated detent elements 28 and 26, respectively, so that the openings 30 and 32 are sealed off from the interfacial region 24 by such snap-in engagements of the detent elements 28 and 26.

As the rotor 14 is then further advanced by manipulation of the handle 15, the ribs 26 ride up onto the surface 26 in preparation for snap-in reception in the next successive detent-defined position, and the rotor 14 then reaches such next position, at which the dispensing openings 30 and 32 in the stator 12 and rotor 14 are unaligned with each other and are in closed condition. This closed position of the clousre is seen in Figs. 5 and 6. As the parts reach this position, each of the dispensing openings 30 and 32 of the stator and rotor is again sealed off from the interfacial region 24 by the snap-in action of its associated detent member 28 or 26 co-operating with the counterpart detent member 26 or 28 on the opposed rotor or stator. The result is that the potential leakage pathway from the interior of the container 16 through the dispensing opening 30, interfacial region 24, and dispensing opening 32 is sealed off both (1) by the snap-in detent action of the detent elements then associated with the dispensing opening 30 and (2) independently by the snap-in detent action of the detent elements then associated with the dispensing opening 32. Only one of these seals need be effective for the leakage pathway to be closed.

Sealing of the other potential leakage path, that through the dispensing opening 30 of the stator, the interfacial region 24, and the sifting openings 34, is similarly accomplished by

the snap-in detent elements associated with the dispensing openings at both ends of such leakage path. Thus in the "closed" rotative position of Fig. 6, such other leakage path is also sealed at both ends.

Thus the aforementioned leakage paths are subjected to a closing action at both ends as the rotor advances to detent-defined closed positions to thereby allow looser manufacturing controls and tolerances or reduce the proportion of closures produced with poor anti-sift properties, as previously discussed.

Although a preferred embodiment of this invention has been shown and described, it should be understood that various modifications and rearrangements of the parts may be restored to without departing from the scope of the invention as defined in the append claims.

CLAIMS

1. A dispensing closure for containers of fine granular materials and the like, comprising a stator and rotor, said stator constituting the body portion of the closure and being capable of being mounted on the end of a container to be closed, said rotor and stator being rotatably inter-engaged, for retention of the one by the other in rotatable relationship, solely at their respective rim portions, with an interfacial region defined between said rotor and stator radially interiorly of their rim portions, corresponding regular arrays of sealing detent members which co-operate with each other to provide a detent action and to seal off said interfacial region, one regular array comprising raised detent ribs and the other regular array comprising detent depressions, each regular array being associated with its own one of said rotor and stator members, said rotor having a number of detent-defined rotative positions relative to said stator and corresponding to the number of elements in each of said arrays, each of said raised circular detent ribs being capable of being received in sealing relationship in one of said detent depressions with a snap-in detent action as said rotor reaches each of its detent-defined rotative positions, at least one stator dispensing opening opening extending through one of said detent members on said stator and at least one rotor dispensing opening opening extending through one of said detent members on said rotor, said stator dispensing opening and rotor dispensing opening being aligned with each other in an open condition but each being sealed off from said interfacial region by said snap-in detent action of its associated detent member co-operating with the counterpart detent member on the opposed rotor or stator as said rotor reaches one of its detent-defined rotative positions, said stator dispensing opening and rotor dispensing opening being unaligned with each other in a closed condition but each again being sealed off from said interfacial region by said snap-in detent action of its associated detent member with a counterpart detent member on the opposed rotor or stator as said rotor reaches another one of its detent-defined rotative positions.

2. A dispensing closure as claimed in claim 1, in which said regular array of raised detent ribs is associated with said rotor and said regular array of detent depressions is associated with said stator.

3. A dispensing closure as claimed in claim 1 or claim 2, in which one of said corresponding regular arrays of detent members comprises a first regular array of at least three members equally spaced around the centre of the closure, a major dispensing opening extending through one of the members of said first array, sifting dispensing openings extending through another of the members of said first array, and at least another of the members of said first array being closed, and a second regular array of at least three members equally spaced around the centre of the closure, a major dispensing opening extending through one of the members of said second array, the remaining members of said second array being closed.

4. A dispensing closure as claimed in any preceding claim, in which the detent ribs and detent depressions are circular in plan view.

5. A dispensing closure for containers substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

6. A container provided with a dispensing closure as claimed in any preceding claim.

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